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**JAMAICA**

**EU-CIF ENERGY MANAGEMENT AND EFFICIENCY INVESTMENT GRANT OPERATION**

 **(JA-G1003)**

**Monitoring and Evaluation Plan**

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Abbreviations

|  |  |
| --- | --- |
| AC | Air Conditioning  |
| BOE | Barrels of Oil Equivalent  |
| CBA | Cost Benefit Analysis |
| CCB/CJA | Country Office in Jamaica |
| CO2 | Carbon Dioxide  |
| EA | Executing Agency  |
| EC | Energy Conservation |
| EE | Energy Efficiency |
| EECTA | Energy Efficiency and Conservation Technical Assistance  |
| ERR | Economic Rate of Return |
| GHG  | Greenhouse Gases |
| GoJ | Government of Jamaica |
| IDB | Inter-American Development Bank |
| INE/ENE | Energy Division  |
| kWh | Kilo-watt hour |
| MSET | Ministry of Science, Energy & Technology  |
| M&V | Measurement and Verification  |
| PEU | Project Execution Unit |

1. Introduction

This document presents the Monitoring and Evaluation Plan for the Energy Management and Efficiency Program (the Program). The purpose of this document is to establish the framework, processes, and institutional arrangements that will be used to monitor and evaluate the Program.

The general objective of this non-reimbursable co-financing which complements the EMEP loan (3877/OC-JA) is to promote a more efficient use of energy resources that would free public funds through avoided oil imports. The specific objectives and expected results of this operation are: (i) reduced electricity consumption in public buildings resulting in avoided GHG emissions and (ii) support to capacity building for energy planning

**Component 1. Retrofitting of Public Buildings[[1]](#footnote-2) (US$9,531,897)** will finance the implementation of EEC measures in 7 public hospitals: (i) the purchase, installation, operation and maintenance of EEC technologies and (ii) the design and implementation of a Communications and Visibility Plan to raise awareness among targeted stakeholders regarding EEC and RE, with respect to building codes, equipment standards and solar PV connection charges and net-billing implementation guidelines.

**Component 2. Support** **to Capacity Building for Energy Planning (US$250,000)** will finance: (i) studies related to the development of Jamaica’s Integrated Energy Plan (IEP) that complements the IRP for the electricity sector by enhancing MSET’s planning expertise within the wider energy sector. The technical studies will focus on fuel switching options, infrastructure, policy and regulation that can make a real difference to final energy cost, reliability and environmental externalities.

In addition, US$218,102 will be allocated for IDB administrative fees. The cost of the program is estimated to be US$10 million, including the two Components noted above.

All Monitoring and Evaluation activities which include data collection, the preparation of annual reports, audited financial statements, final report filed visits, baseline value study (IGA’s), mid and final term evaluation, ex-post cost benefit analysis (CBA), project completion report (PCR) have been duly quantified and will be financed in its entirety with funds allocated under the JA-L1056 loan operation.

In order to monitor and evaluate the expected results of the Program, a before and after assessment methodology will be used, as well as an ex-post cost-benefit analysis. The key monitoring tools for the M&E plan include maintaining records during the implementation process[[2]](#footnote-3), measuring electricity consumption and the reduction of CO2 emissions resulting from reduced electricity consumption in the 7 public hospitals retrofitted. The evaluation methodologies include before and after analysis of key outcome indicators and an ex-post cost-benefit analysis. The ex-post cost-benefit analysis of the investments funded in its entirety by the JA-L1056 loan operation will follow the same assumptions, methodology, and modeling parameters as the ex-ante cost-benefit analysis that was performed as part of the loan preparation process.

This Monitoring and Evaluation (M&E)[[3]](#footnote-4) Plan is organized in two main sections:

* **Monitoring Plan** (Section 2)—presents the indicators used to monitor the deliverable of Program’s outputs, assigns the responsibility for collecting data, defines the instruments used to monitor the Program, and establishes the work plan and budget for monitoring the Program.
* **Evaluation Plan** (Section 3)—presents the main questions the Evaluation Plan addresses, mentions the studies that the Evaluation Plan builds upon, identifies the outcome and impact indicators used to evaluate the Program, and describes the methodology and instruments used to evaluate the results of the Program.
1. Monitoring

The Program will be monitored by tracking a set of output indicators that measure performance in terms of project deliverables. The monitoring plan defines these indicators and establishes the process and institutional arrangements to monitor these indicators. Specially, the monitoring plan describes the instruments and processes used to track these output indicators, defines the tasks, assigns responsibilities, and defines the necessary budget for preparing these instruments.

1. 2.1 Output Indicators

Table 1 presents the indicators that will be used to measure whether the Program’s outputs are fulfilled. The Petroleum Corporation of Jamaica (PCJ) will be the Executing Agency (EA) of the Program, and therefore, the main party responsible for providing inputs to monitor the Program. The indicators, its description, and source of verification are detailed in the following table.

**Table 1: Project Output Indicators by Component**

|  |  |  |  |
| --- | --- | --- | --- |
| Indicator | Formula | Frequency of Measurement | Source of Verification |
| **Output Indicators** |
| Component 1: Retrofitting of Public Buildings |
| Retrofit of 7 Public Hospitals with Energy Efficiency (EE)[[4]](#footnote-5) equipment replaced, installed and operating | # of public buildings | Biannually | Annual reports from PCJ  |
| Communication activities completed to raise awareness on EE management & maintenance in the 7 public hospitals retrofitted | # of workshops | Biannually | Annual reports from PCJ  |
| Communication activities completed to raise awareness on EE management & maintenance in the 7 public hospitals retrofitted | # of multimedia campaigns | Biannually | Annual reports from PCJ |
| Component 2: Support to Capacity Building for Energy Planning |
| Complementary technical studies to support Electricity Planning and Jamaica’s IRP(Studies will focus on fuel switching options, infrastructure, policy and regulation that can make a real difference to final energy cost, reliability and environmental externalities) | # of studies | Biannually | Annual report from MSETIndependent M&E Report. |

A baseline value and year has been defined and the responsibilities for monitoring these indicators will lie within the PEU.

Table 2 shows the Physical Progress as planned during the project execution by Output and Component

Moreover, Table 3 presents annual costs by output indicator

**Table 2: Project Execution Timeline by Output and Milestone**

| Indicator | Unit | Baseline (2015) | Year 1 | Year 2 | Year 3 | Year 4 | Final Target (EOP) | Source of Verification |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Public Hospitals with Energy Efficiency (EE) equipment replaced, installed and operating | # of public buildings | 0 | 0 | 2 | 3 | 2 | 7 | 7 Investment Grade Audits (IGAs) will be completed to achieve these outputs.Annual reports from PCJ  |
| Communication activities completed to raise awareness on EE management & maintenance in the 7 public hospitals retrofitted | # of workshops | 0 | 0 | 0 | 0 | 1 | 1 | Annual reports from PCJ List of participant and follow-up monitoring to participants per workshop |
| Communication activities completed to raise awareness on EE management & maintenance in the 7 public hospitals retrofitted | # of multimedia campaigns | 0 | 0 | 0 | 0 | 3 | 3 | Annual reports from PCJ |
| Complementary technical studies to support Electricity Planning and Jamaica’s IRP | # of studies | 0 | 1 | 0 | 0 | 1 | 2 | Annual report from MSETIndependent M&E Report. |

**Table 3: Annual Costs by Output (US$ millions)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Outputs** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Final Target** |
| Retrofit 7 Public Hospitals with Energy Efficiency (EE) equipment replaced, installed and operating (7 Investment Grade Audits (IGAs) will be completed to achieve these outputs) | - | 3,110,632  | 3,110,632  | 3,110,632  | **9,331,897**  |
| Communication activities completed to raise awareness on EE management & maintenance in 7 Public Hospitals retrofitted (workshops) | - | - | - | 50,000 | **50,000** |
| Communication activities completed to raise awareness on EE management & maintenance in 7 Public Hospitals retrofitted (multimedia campaigns)  | - | - | - | 150,000 | **150,000** |
| **Sub-total Component I** | **-** | **3,110,632** | **3,110,632** | **3,310,632** | **9,531,897** |
| Number of complementary technical studies to support Electricity Planning and IRP(studies will focus on fuel switching options, infrastructure, policy and regulation that can make a real difference to final energy cost, reliability and environmental externalities) | 70,000 | - | - | 180,000 | 250,000 |
|  **Sub-total Component II** |  **70,000**  |  **-**  |  **-**  |  **180,000**  |  **250,000**  |
|  **Total**  |  **70,000**  |  **3,110,632**  |  **3,110,632**  |  **3,490,632**  |  **9,781,897**  |

**2.2 Data Collection and Instruments to Monitor the Project Indicators**

The primary objective of the monitoring plan is to monitor the overall achievement of the program execution, and more specifically to monitor the progress of implementation related to energy efficiency and conservation measures, as well as the measurement of the associated energy or demand savings. Progress for component one will be measured against the IGAs that provide a detailed outline of the measures required. Measurement activities involve data collection, monitoring and analysis necessary to document the energy and demand savings and expected costs of the energy efficiency project.

The EA will hire a specialized and independent consulting firm to collect the data from:

* The 7 public hospitals
* MSET on all matters related to component 2, and
* JPS electricity bills for the 7 retrofitted public hospitals, and from equipment installed.

The data collection exercise is therefore key to the M&E process, and the PEU will be responsible (via the M&E specialist within the PEU)[[5]](#footnote-6) for receiving, reviewing and verifying the data collected by the independent consulting firm. The PEU will provide monthly reports on the results of the data collection, and will use the baseline year of 2015 to assist with the verification. These reports will be stored at the PCJ and made available to relevant Government Stakeholders and the teams at IDB, JICA and the EU. The MSET will also receive the reports as a basis of developing the national database on Energy Efficiency Measures/Programs and this will support broader Electricity Planning.

The PEU will develop the following activities to support the planning and execution of the Project:

* **Project Operations Manual (OM).** The Project Operations Manual will detail all roles, responsibilities, specific individual members, and operational arrangements that may be required for the PEU to execute the Project. The OM must include the principles and requirements from the Environmental and Social Management Plan (ESMP) draft annexed to the Environmental and Social Assessment (ESA), as well as the terms of reference for each of the PEU’s members. The OM will also be used to revise and update existing planning instruments that will form the baseline for project monitoring and evaluation and as the initial entry for the project monitoring report (PMR). These instruments include the Results Matrix, the Risk Matrix, the initial Pluriannual Execution Plan (PEP), the initial 12-month Annual Operating Plan (AOP), and the initial Procurement Plan (PP) for the first 12 months of the Project. The OM must be completed and approved by the EA prior to the first disbursement of the JA-L1056 loan operation.
* **Pluriannual Execution Plan (PEP) and Annual Operations Plan (AOP).** The PEP and AOP consolidate all activities that will be developed as part of the Project execution, including detail by project and a timeline of both physical and financial progress. In each semi-annual report (noted below), the PEU will present the PEP and AOP for the following 12 months. The AOP will include details on the Project’s progress and execution of activities including goals, results, budget, and implementation schedule. The PEP will detail the project’s progress and implementation schedule for the outstanding years of the JA-L1056 and JA-G1003.
* **Procurement Plan (PP).** The PP includes details on all works, goods, and services that will be required to implement the Project during a determined period of time. The initial PP covers the expected procurement requirements for the first 12 months of the Project. It will be updated at least once every 12 months, and can be amended as often as necessary, by agreement between the EA and the IDB. The PP will include details on procurement of works, goods, and non-consulting services and their compliance with IDB policies (GN-2349-9), as well as the procurement of consulting services and their compliance with IDB policies for selecting and contracting consultants financed by the IDB (GN-2350-9) that exceed established thresholds.

**2.2.1 Future Considerations-Data Collection**

The Government of Jamaica (GOJ) through its Ministries, Agencies and Departments (MDAs), has invested significantly in ICT infrastructure to facilitate efficiency in operations and provision of services to its citizenry. The implementation of GovNet will provide the secure WAN backbone communication infrastructure to aid in achieving the aforementioned results.

**Component I. Retrofitting 7 Public Hospitals**

Besides the annual energy bill for each hospital, it will be necessary to measure the electrical load of the EE equipment installed. In order to do so, the PEU will use devices to measure electrical current. The most common way of sensing alternating electrical current (AC) for energy efficiency and savings applications is with a current transformer or current transducer (CT). CTs are placed on wires connected to specific loads such as motors, pumps or lights and then connected to an ammeter or power meter. CTs are available in split core and solid toroid configuration. This M&V equipment will assess the impact of each replacement per category (i.e lighting systems, HVAC systems, kitchen operations, RE, and building envelope measures) according to the technology used and replaced. The PEU (PCJ) will be responsible for the installation of the measurement devices and the collection of data. The PEU will report semi-annually to the Bank about the results, and a consolidated **annual** report will be submitted to the EU not later than 120 calendar days after the reporting period. This annual report will include: (a) a narrative and financial parts with the progress of the project; (b) disbursement requests to EU, if applicable.

**Component II. Support to Electricity Planning and Jamaica’s Integrated Resource Plan (IRP)**

Indicators concerning the complementary technical studies will be straight-forward, by counting of the number of studies prepared.

The PEU’s Sub Project Manager-MSET will be responsible of collecting the data and reporting to relevant Government Stakeholders and the IDB. The Sub Project Manager will prepare progress reports on:

* Complementary Technical Studies to support Electricity Planning and Jamaica’s Integrated Resource Plan (IRP)

**2.3 Reporting Monitoring Results**

The IDB will use four instruments to monitor the Program’s progress. The Executing Agency (EA) will submit to the Bank[[6]](#footnote-7):

* Annual Reports (including the execution reports for the physical progress of the Program, a narrative and financial part, savings reports for the retrofitted buildings, and implementation of the Visibility and Communication Pan).[[7]](#footnote-8) The annual report will include the information presented on semiannual reports, and will be accompanied by a Disbursement Request, if applicable
* Field Visits/Inspections
* Due diligence, Annual Supervision Missions

and any other information required to ensure the successful implementation of the Program, including lessons learned. The Program’s monitoring system will also identify critical events and risks for the Program.

**2.4 Monitoring Coordination, Work Plan, and Budget**

The IDB will be responsible for overseeing the execution of the Monitoring Plan for the complete Program, including the funds provided by other donors[[8]](#footnote-9). The IDB will also be responsible for reporting to the other donors on the execution and results of the Program.

The PEU is responsible for preparing the monitoring reports above mentioned with support of IDB Country Office (CCB/CJA), the Energy Division (INE/ENE) which will be responsible for overseeing the execution of the M&E Plan for the complete Program, including funds provided by other donors. As such, the results shall be gathered and analyzed semi-annually, and reported to the EU on annual basis on progress towards achieving the results of the Program. The EA should facilitate any independent monitoring information required by the donors in coordination with the Bank. Each report must be submitted no later than 30 days after the end of the reporting period agreed in the Delegation Agreement to the IDB.

The annual progress report will present to the IDB the degree of fulfillment of the output indicators as recorded in the updated PEP, AOP, and PP. This will allow the Bank to monitor these indicators using the Bank’s PMR tool.

The annual progress reports must include the following sections:

1. A **narrative** part, which shall include information on the: (i) actual results and/or progress toward project execution indicators (with an updated table on the project’s Results Matrix), the agreed disbursement calendar, and timelines for physical progress in implementing the program investments; (ii) compliance with contractual obligations; (iii) description and general information on the completed activities; (iv) implementation of the Visibility and Communication Plan ; (v) description of any procurement tenders that have been carried out; (vi) evaluation of any contracting companies carrying out physical works; (vii) socio-environmental management of the project, including timelines, results, and measures implemented to ensure compliance with socio-environmental obligations; (viii) a detailed activities program and execution plan for the following 12 months; and (ix) potential developments or events that could put the execution of the Project at risk; and (x) updates to the Project PEP, AOP, and PP.
2. **A financial** part requires tracking and reporting of expenses at the activity level (not by component or sub-component), based on the approved detailed budget structure (Legal commitments, receipts and costs incurred in currencies other than the project’s accounting currency shall be converted following the Bank’s application of exchange rate method defined in OP-273-6. And an estimated cash for the following 12 months.

The annual reports must include all relevant information to understand the progress toward meeting the project output and outcome indicators and to identify any areas that require improvement in data collection, processing, analysis and reporting.[[9]](#footnote-10) In addition, the EA will present to the Bank a mid-project interim evaluation after the earliest of three years after the project initiation or once 50% of the Project resources have been disbursed. This mid-project evaluation will assess the level of completion of the project output indicators (see Table 1) in order to determine the project implementation status. This evaluation will be used to propose any changes in the project scope or process that may be required in order to reach the project’s targets. Finally, after completing 90% of the Project’s disbursements, the EA will present to the Bank the Final Project Evaluation Report which will include, among other requirements, the ex-post cost-benefit evaluation of the Components financed under the Project. This report will serve as the basis for the Bank to prepare a Project Completion Report (PCR) once the project execution is completed (OP-1242-3), in parallel to the PCR the EA has to present the Final Report[[10]](#footnote-11) to the IDB, the final report will be presented to the EU with the final payment request

The PCR is a record of an operation’s performance at the end of its execution phase, undertaken as a self-evaluation by the IDB’s unit responsible for the project. The PCR is the Bank’s Management main instrument for documenting concrete results to its shareholders and disseminating the lessons of a project’s experience. The PCR is also a tool for accountability and learning. The accountability objective addresses the need for the Bank to ensure that the proceeds of the project are used for the purposes for which the project was granted, with due attention to effectiveness and efficiency. The learning objective aims to replicate successes and avoid mistakes in the future by providing lessons to guide the execution of ongoing projects and the design of future ones.

The project team, led by the specialist from the Jamaica country office with the support of the INE/ENE team, will be in charge of following up the execution, monitoring and evaluation of the program. The EA and the IDB will carry out field visits/inspections according to a regular schedule to be agreed upon between the two parts. Field visits/inspections are designed to monitor the progress in implementing the EE and EC measures. As such, they would provide an opportunity for the IDB to validate the field progress reported in the semi-annual reports. The IDB is responsible for coordinating the field visits with support from the EA. Other donors may want to participate in the field visits/inspections (at their own cost) will coordinate it with the IDB. These field visits/inspections shall be planned in advance and in a collaborative manner and the procedural matters shall be agreed upon in advance between the IDB and the donors. Field visits are to be carried out semi-annually, within a 30-day period after the report is submitted. The IDB shall report on the results of such missions to the EU/EC.[[11]](#footnote-12)

The Bank will allow the EC, European Anti-Fraud Office (OLAF), and the European Court of Auditors to conduct on-the-spot checks on the use made of EU contributions on the grounds of supporting accounting documents and any other documents related to the financing of the project. These desk-reviews and **on-the-spot** checks can occur at the Bank’s offices and the Executing Agency. The European Commission shall inform the Bank in due time in order to ensure that adequate procedural matters are agreed upon in advance. These **verification visits** may be conducted at the Bank offices or the EA.[[12]](#footnote-13)

It is expected that at least 10 percent of the monthly time of the PEU is dedicated to M&E activities. A monitoring and evaluation specialist will be hired by the EA in order to lead the gathering and reporting of all information from the Program. The budget for completing the Monitoring and Evaluation Plan is US$350,000 (US$100,000 for evaluation and US$250,000 for monitoring) and for auditing (IGA’s) is US$300,000.

**Table 4: Monitoring and Reporting Work Plan**

| **Monitoring and Evaluation Plan** | Year 1 | Year 2 | Year 3 | Year 4 | Lead | Cost (US$'000) | Financing |
| --- | --- | --- | --- | --- | --- | --- | --- |
| I | II | III | IV | I | II | III | IV | I | II | III | IV | I | II | III | IV | I |  |  |  |
| Operation Kickoff meeting |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB | 0 | IDB |
| Project Monitoring Report Workshop (Initial Plan) |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB |
| Fiduciary Workshop |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB |
| Procurement training |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB |
| Ongoing fiduciary monitoring |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB |
| Semi-annual meetings and technical supervision visits |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB |
| Environmental and social supervision visits |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB |
| Operations Manual (OM) |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB |
| Completion of monitoring and evaluation tools (PEP, AOP, PP)  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU | 60 | Included in Project "Monitoring, Evaluation and Audits" cost |
| Prepare annual progress reports |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU |
| Analyze and approve annual progress reports |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB | 0 | IDB |
| Analyze and approve disbursement requests |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | IDB |
| Component 1: Retrofitting 7 Public Hospitals |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU | 140 | Included in Project "Monitoring, Evaluation and Audits" cost |
| Component 2: Support to Electricity Planning and Jamaica’s IRP |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU |

\*\*\* To be submitted to the Bank no later than 120 days after the final disbursement justification

1. 3. EVALUATION

Evaluation refers to a review of the entire program including the implementation process, program cost effectiveness, and the attainment of its stated impact and outcomes indicators. The Evaluation Plan first defines what questions the indicators address, and then it describes the indicators that will be used to evaluate the results of the Program. It also explains the before and after evaluation methodology and the instruments that will be used to evaluate the Program. Lastly, it describes the institutional arrangements and work plan to carry out the Evaluation Plan.

* 1. Main Evaluation Questions

The purpose of the evaluation is to assess the outcomes of the Project. The main evaluation questions are as follows:

* Has electricity consumption from the 7 Public Hospitals decreased as result of energy efficiency measures by the Program?
* What was the impact of the Program towards reducing the amount of greenhouse gas emissions resulting from reduced electricity consumption in the 7 Public Hospitals?
* Has the government (MSET) received proposals that extends Energy Efficiency (EE) or Renewable Energy (RE) initiatives in Jamaica?
1. 3.2 Existing Knowledge (previous evaluations, ex-ante economic analysis)

Prior to the preparation of the Program, The Energy Efficiency and Conservation Technical Assistance (EECTA) report, which was completed in 2011 and reviewed 2009-2010, was based on 22 Walk through audits and 14 detailed audits. The EECTA indicated that an investment of approximately US$113 million had the potential of saving 101GWh/year, or 25% of the electricity consumption of the Jamaican public sector at the time (estimated at 411kWh/year).

In 2016, DNV-GL executed investment grade audits over six different buildings in Jamaica, including 4 hospitals. The information resulting from those audits has been used to project and assess the investment costs and potential improvement measures that could lead to savings during the following years in the seven hospitals targeted under this project. After the technical inspections, DNV-GL run a series of financial tests considering the potential loan interest rates and the investments that were needed to be carried out.

This project is using the above mention information to project the costs and potential savings in the 7 hospitals that will be retrofitted. Based on the electricity consumption and the number of beds of each of them, it is possible to make an analogy with the existing Investment Grade Audits in other similar hospitals and project of the investment costs and potential resulting savings. In this project, the total investment costs to retrofit the 7 hospitals are estimated over US$9 million.

**3.2.1 Ex-Ante Cost Benefit Analysis**

The analysis comprises the energy assessment performed to the defined group of 7 hospitals for improving their energy characteristics. The benefits consisted of electricity savings (direct effect) and reduction of CO2 emissions (externality). The costs consist mainly on the investment cost of the different recommended measures (O&M costs are lower than business as usual therefore irrelevant). The more relevant assumptions of the analysis are: (i) the savings and investments required are projections from 7 existing audits made on similar buildings for the EMEP loan, (ii) the economic life of each energy efficiency may vary of from 5 to 20 years, (iii) the analysis period is 20 years to include the average life of EE and PV installations, (iv) the economic discount used is 12%, as usually used by the IDB, (v) the electricity prices are based on an average of historical costs ($USD/kWh) per building without considering inflation; and (vi) annual escalation rate: 0.29% for the first 5 years; 2.18% for the remaining years (based on WTI crude forecast growth rate).

The results for the base case show an EIRR of 23.4% and the ENPV is US$5,353,832. A sensitivity analysis was performed to test the impact of significant changes to investment costs and the electricity price. The project showed to be economically robust.

The project is also characterized by environmental externalities such as reduction of CO2 emissions. It is expected that the implementation of the EE measures will reduce CO2 emissions in 9,003 Ton per year. If it were included assuming US$37/ton as benefit – the assumption used in the fuel efficiency component II of the loan, the EIRR would increase to 24,1% and the ENPV would increase to US$5,590,934.

**3.3 Key Outcomes (Expected Results) Indicators**

The key outcome/expected results indicators as well as its formula, frequency of measurement and source are described in the table below. These key indicators will be assessed and presented to the IDB through annual monitoring reports.

**Table 5. Key Outcomes and Expected Results Indicators[[13]](#footnote-14)**

|  |  |  |  |
| --- | --- | --- | --- |
| Indicator | Formula | Frequency of Measurement | Source of Verification |
| **Results Indicators** |
| Component 1: Retrofitting of Public Buildings |
| **Expected Result 1: Reduced electricity consumed in 7 Public Hospitals** |
| Annual electricity consumed in 7 Public Hospitals | kWh | End of the project | Annual Report from PCJM&E consulting firm report |
| **Expected Results 2: Reduced CO2 emissions resulting from reduced electricity consumption in 7 Public Hospitals** |
| Annual CO2 equivalent emissions avoided resulting from kWh consumed in the 7 Public Hospitals | Tons of CO2 equivalent | End of the project | Annual Report from PCJ M&E consulting firm report |
| Component 2: Support to Capacity Building for Energy Planning |
| **Expected Result 3: Support to Electricity Planning and Jamaica’s IRP** |
|  Number of EE/RE proposals received by MSET to further support the IRP (2020) | # of proposals received | End of the project | Annual Report from PCJ M&E consulting firm report |

* 1. Evaluation Methodology

The IDB will follow a before-completion and after-completion methodology to evaluate the results of the Program. Specifically, for a group of indicators, the IDB will compare baseline values against the values after the Program is completed. This is the same methodology that is used for monitoring of outputs of the Program. The only difference is the point in time when the methodology is applied. For monitoring the Program, the methodology is applied from the point of Program implementation and is done on a yearly basis. For evaluating the Program, the methodology is used after the Program is completed comparing baseline values and targets.

The evaluation will be based on the information gathered through Program monitoring. By measuring baseline values in year 0 (2015), the IDB will simulate a counterfactual of what the performance for these indicators would be if the Program would not be implemented. This methodology assumes that if the Program were not implemented, indicator values would remain at their baseline values.

As previously mentioned, the main instrument the IDB will use to evaluate the Program will be the Project Completion Report (‘PCR’), which compares the Program results against baseline values. The PCR is a record of an operation’s performance at the end of its execution phase, undertaken as a self-evaluation by the IDB’s unit responsible for the project. The PCR is the Bank’s Management main instrument for documenting concrete results to its stakeholders and disseminating the lessons of a project’s experience. The IDB will base the PCR on mid-term and final evaluations and an ex-post CBA. These instruments are described in more detail in the following section. Performing an ex-poste cost benefit analysis is also appropriate in order to determine the accuracy of the ex-ante cost benefit analysis and the root cause of any differences between the two. This comparison will identify specific factors in the project implementation that resulted in higher or lower costs and benefits than were anticipated, helping to improve the design and implementation of similar projects in the future.

Also, in addition to the evaluation described in this section, the IDB Oversight Evaluation Office (OVE) may also separately evaluate the impact of the Program.

The intermediate evaluation will be done through a before and after methodology based on the indicators defined in the results framework matrix. The final evaluation, to be carried out when 100% of the resources have been disbursed, will also include an (ex-post) cost benefit analysis (CBSA) of the Program. Both evaluations, intermediate and final will be carried out by an independent third-party consultant firm.

* 1. Reporting Evaluation Results and technical aspects of the methodology

The EA will be responsible for reporting on the results of the Program, based on information collected from installed equipment and systems and electricity bills. The EA will be responsible for reporting progress and results to the IDB. The EA will collect, store, and retain all information to assist the IDB in evaluating performance of the Program.

The Measurement and Verification (M&V) of energy savings will follow the IPMVP and information for monitoring the Program includes EA annual reports, IDB’s field inspections, and EA administrative records and financial statements. The EA will be responsible for providing administrative records, financial statements, and will participate in the IDB’s field inspections.

The system upgrades at some of the facilities receiving deep retrofits will include monitoring equipment such as Automated Building Management Systems (ABMS) that will help gather the data required to measure the indicators. At smaller facilities, monitoring equipment will be installed on a temporary basis to measure the indicators. This will assist in the acquisition of all data as well as the establishment and maintenance of databases to facilitate the monitoring and evaluation of the impact of energy efficiency measures. Data will include electricity bills, monitoring measures implemented at each location, and the correlation of interventions with consumption reduction.

The Energy Division of the IDB will be responsible for overseeing the execution of the Monitoring and Evaluation Plan for the complete Program, including the funds provided by other donors. As such, they must report annually to the European Community (EC) on progress towards achieving the results of the Program.

The project team composed by the IDB Country Office (CCB/CJA), the Energy Division (INE/ENE), will be responsible for overseeing the execution, monitoring and evaluation of the program.

There are four instruments that the IDB will use to evaluate the Program’s results. The instruments are as follows:

* Baseline Value Study (IGA’s)
* Mid and Final Term Evaluation
* Ex-post Cost Benefit Analysis (‘CBA’)
* Project Completion Report (PCR)

For each instrument, the remainder of this section describes its purpose, the entities responsible for preparing it, and, when applicable, the methodology used in its preparation.

**Mid-term Evaluation**: The mid-project evaluation will be initiated after the earliest of three years after the project initiation or once 50% of the Project resources have been disbursed. This mid-project evaluation will assess the level of completion of the project output indicators (see Table 1) in order to determine the project implementation status. This evaluation will be used to propose any changes in the project scope or process that may be required in order to reach the project’s targets.

The mid-project evaluation will use a before and after methodology to evaluate the annual results of the three outcome indicators noted above. The before and after methodology is the most appropriate methodology to assess the change in the identified key outcome indicators after the investments that are funded by the Project are implemented.

This evaluation will also examine aspects of coordination and execution, and recommend any needed adjustments that may be required to improve progress toward the proposed targets and increase coordination and execution efficiency.

This analysis will be based on the reports and data gathered through the project monitoring as noted above, in particular the semi-annual and annual progress reports, the AOPs for each prior year, and the PP.

**Final Evaluation**[[14]](#footnote-15): The final evaluation will be completed by the PEU no later than 120 days after the final disbursement justification. The final evaluation includes: (a) the degree of fulfillment of the targets specified in the Results Matrix; (b) an ex-post CBA; (c) an assessment of the performance of the EA; (d) factors affecting implementation; and (e) lessons learned and recommendations for the design of future operations. The Final Evaluation will allow the Bank to finalize the Project Completion report (PCR).

The final evaluation will evaluate the three outcome indicators noted in Table 5, and the four output indicators noted in Table 1. It will be based upon the reports and data gathered through the project monitoring as noted above, in particular, the semi-annual progress reports, the AOPs for each prior year, and the PP.

**Ex-post Cost Benefit Analysis (‘ex-post CBA’)**: The ex-post CBA will measure whether the actual economic benefits of the Program exceeded its actual economic costs and how these compared to estimations made when the Program was designed. The ex-post CBA will follow the same methodology used for preparing the ex-ante CBA presented in the Cost Benefit Analysis Report which is an Optional Electronic Link of the POD.

Performing an ex-post CBA will determine the accuracy of the ex-ante CBA and the root cause of any differences between the two. This comparison will identify specific factors in the project implementation that resulted in higher or lower costs and benefits than were anticipated, helping to improve the design and implementation of similar projects in the future.

The ex-post cost-benefit analysis (CBA) will mirror the methodology used in the ex-ante CBA in order to produce results that can be directly compared with the outcomes that were predicted in the ex-ante CBA. The ex-post CBA will calculate the economic NPV of each sub-project based on the present value of the sub-projects’ actual benefits and costs to date and the projected costs and benefits at the time of the ex-post analysis. Historical data for the ex-post CBA will come from the project reporting documents, including the semi-annual progress reports, the AOPs for each prior year, and the Procurement Plan.

For example, the benefit of the retrofitting of 30 government facilities[[15]](#footnote-16) with EE and RE equipment will be calculated from the saving in electricity expenditures and the monetary value of the reduction in greenhouse gas emissions that results from reducing fuel oil consumption in power plants. The cost of these retrofitting will be based on the actual economic costs of implementing the project, including the cost not financed by the IDB, and the actual historical and projected future cost of operating the retrofitted buildings. The difference between these two values for each year of the project period (both historical and projected) will then be calculated, and the present value of that difference will be calculated using a 12 percent discount rate, as generally used by the Bank in economic analysis.

The ex-post CBA will compare the aggregate economic Net Present Value and economic internal rate of return of the three sub-projects and compare them with the ex-ante results as well as a business-as-usual (BAU) scenario without the actual investments. The benefits of the sub-projects, including estimated avoided economic losses from electricity shortages, savings on liquid fuel expenditures, and the monetary value of avoided greenhouse gas emissions related to the displaced consumption of liquid fuels for electricity generation, will be compared with both the anticipated benefits as calculated in the ex-ante CBA and the actual benefits against the BAU scenario without the investments.

The ex-post CBA will highlight differences in the actual investment program, including scale, timing, and cost; differences in external factors, such as electricity and oil prices and Jamaica’ energy demand growth; and, any challenges or lessons learned from the project implementation. This assessment will help to identify root causes of any variation in the results of the ex-poste CBA and the ex-ante CBA analysis.

The EA is responsible for hiring the independent consultant that will prepare the ex-post CBA, and reviewing and approving the final draft of the ex-post CBA. The EA is responsible for providing the independent consultant with the information needed to complete the ex-post CBA. In addition, the EA will coordinate with local authorities to obtain any information that the external consultant may require to complete the ex-post CBA. The ex-post CBA will be developed as part of the Project Completion Report completed for the Program.

The Project Completion Report (PCR) is designed to assess and document the performance of the Program. The PCR evaluates three main areas: whether the Program met their targets for results indicators, whether the results are sustainable, and the issues that affected how successful the Program and sub-projects were in achieving their intended results.

In evaluating whether the Program met the targets for results indicators, the PCR uses a before and after methodology that compares the baseline values of the results indicators against the indicator values after the Program and/or Project is completed. As part of the PCR completed for the Program, an ex-post Cost Benefit Analysis (CBA) will be developed.

The evaluation of the sustainability of the results and the issues that affected the Program are sustainable, the PCR identifies the risks that could affect the sustainability of the Program’s results, and their likelihood and severity. The four main kinds of risks that should be considered include: financial risks, sociopolitical risks, institutional framework and governance risks, and environmental risks. In evaluating issues, the PCR considers the risks that were not properly mitigated against and turned into issues that affected the implementation of the Program and sub-projects. Examples can include poor local implementation capacities and delays and effects thereof on the Program’s results.

* 1. Evaluation Coordination, Work Plan and Budget

The PEU will be responsible for coordinating and carrying out the mid-project and final project evaluations, including: (i) gathering the necessary data and prior reports; (ii) hiring an independent consultant to process and analyze the data and prepare the evaluations reports; and, (iii) overseeing the consultant’s work. The consultant will rely upon information from the monitoring program and related reports, and will also require active cooperation and input from the EA, MSET, and the IDB project team.

The IDB, through the Project Team Leaders, is responsible for coordinating and assuring that the mid-project and final evaluations comply with all technical and quality requirements and are completed on schedule. The IDB team will achieve this through periodic meetings with the EA and the consulting firm responsible for conducting the evaluations in order to review progress of works and, if required, request progress reports or additional presentations of the results

The budget for completing the Monitoring and Evaluation Plan is US$350,000 (US$100,000 for evaluation and US$250,000 for monitoring) and for auditing (IGA’s) is US$300,000[[16]](#footnote-17). The tasks of the Evaluation Plan will be carried out at the start, at the halfway point, and at the completion of the Program. All reports and M&E activities for the entirety of the Energy Management and Efficiency Programme (EMEP) will be financed through the proceeds of the loan operation JA-L1056. For each evaluation instrument, the remainder of this section describes when it should be prepared, who prepares it, and how it will be funded.

* **Baseline Values (IGA’s)—**will be the responsibility of PEU, via procured contract of an external consulting firm. The Baseline Values Study will be prepared within the last quarter before the Program starts. The additional 17 IGA’s will cost an estimated US$300,000.[[17]](#footnote-18)
* **Midterm and Final Evaluation**—will be procured by the PEU and prepared by an independent external consulting firm.
* **Ex-post Cost Benefit Analysis**—will be procured by the PEU and prepared by an independent external consultant/consulting firm.

**Table 6: Evaluation Work Plan**

| **Monitoring and Evaluation Plan** | Year 1 | Year 2 | Year 3 | Year 4 | Lead | Cost (US$'000) | Financing |
| --- | --- | --- | --- | --- | --- | --- | --- |
| I | II | III | IV | I | II | III | IV | I | II | III | IV | I | II | III | IV | I | II |  |  |  |
| Mid-term evaluation |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU | 100 | Included in Project "Monitoring, Evaluation and Audits" cost |
| Final Evaluation (\*\*\* to be submitted to the Bank no later than 120 days after the final disbursement justification) |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU |
| **Expected Result 1:** Reduced electricity consumed in 7 Public Hospitals |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU | 50 | Included in Project "Monitoring, Evaluation and Audits" cost |
| **Expected Result 2:** Reduced CO2 emissions resulting from reduced electricity consumption  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU |
| **Expected Result 3:**  Number of EE/RE proposals received by MSET to further support the update of the IRP (2020) |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | PEU |

1. The selected 7 public hospitals are: University Hospital West Indies, Bustamante Children Hospital, St Anns Bay Hospital, Burke RD Hospital, Annotto Bay Public Hospital, Port Antonio Hospital, and Port Maria Hospital. [↑](#footnote-ref-2)
2. According to the Framework Agreement signed between the Bank and the European Commission (EC) the Executing Agency is required to keep, for a period of five years (as of project final disbursement end date, meaning the end of the execution period) the corresponding project and procurement documentation for verification and audit purposes. [↑](#footnote-ref-3)
3. All reports will be in English and financial information will be reported in US Dollars. [↑](#footnote-ref-4)
4. EE measures include HVAC, lighting, solar PV installation, and building envelope. [↑](#footnote-ref-5)
5. The hiring of a M&E specialist will be financed with allocated funds under the JA-L1056 loan operation. [↑](#footnote-ref-6)
6. The delivery dates and timelines for the following documents will be defined in the Delegation Agreement between the EU and BID: (i) the annual progress report and the disbursement request; (ii) The annual audited financial statement and the Management Declaration. [↑](#footnote-ref-7)
7. Annual reports should include the following annexes: (a) Detailed Budget, and b) Communication and Visibility Plan. [↑](#footnote-ref-8)
8. Including JICA. [↑](#footnote-ref-9)
9. At year-end (annually), an internal control assurance report should be provided describing whether the control systems in place function properly and the underlying transactions are managed in accordance with the provision of the Non-reimbursable financing Agreement and its supplementary provisions. [↑](#footnote-ref-10)
10. The content of the final report is defined in the GN-2605-4 “Operational guidelines for the processing, approval and supervision of project specific grants financed with resources from the European Commission.” [↑](#footnote-ref-11)
11. In addition to the Bank’s mission report, the EU/EC will prepare its own mission report and share the draft version in the Bank for comments prior final issuance. [↑](#footnote-ref-12)
12. In these cases, the Bank (team leader) with the support of ORP/GCM PSG Working Group members and LEG, will define the procedural matters. [↑](#footnote-ref-13)
13. Baseline year 2015. [↑](#footnote-ref-14)
14. This Final Report will be all-inclusive, as it should include information from the beginning of the project until the end. [↑](#footnote-ref-15)
15. The retrofitting of 23 Public Facilities will be financed under JA-L1056 and the retrofitting of 7 Public Hospitals will be financed under JA-G1003. [↑](#footnote-ref-16)
16. Investment Grade Audits will be prepared for an additional 17 facilities in the context of the JA-L1056. [↑](#footnote-ref-17)
17. For additional information, see JA-L1056. [↑](#footnote-ref-18)